

SEQUENCE LISTING

(1) GENERAL INFORMATION:

(i) APPLICANT:

- (A) NAME: BO NIKLASSON
- (B) STREET: Sibyllegatan 15
- (C) CITY: Stockholm
- (E) COUNTRY: Sweden
- (F) POSTAL CODE (ZIP): 114 42

(ii) TITLE OF INVENTION: NEW PICORNAVIRUSES, VACCINES AND DIAGNOSTIC KITS.

(iii) NUMBER OF SEQUENCES: 4

(iv) COMPUTER READABLE FORM:

- (A) MEDIUM TYPE: Floppy disk
- (B) COMPUTER: IBM PC compatible
- (C) OPERATING SYSTEM: PC-DOS/MS-DOS
- (D) SOFTWARE: PatentIn Release #1.0, Version #1.30 (EPO)

(2) INFORMATION FOR SEQ ID NO: 1:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 264 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: cDNA to mRNA

(iii) HYPOTHETICAL: NO

(vi) ORIGINAL SOURCE:

- (A) ORGANISM: PICORNAVIRIDAE
- (C) INDIVIDUAL ISOLATE: LJUNGAN 87-012

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 1:

AGTCTAGTCT TATCTTGTAT GTGTCCTGCA CTGAACTTGT TTCTGTCTCT GGAGTGCTCT 60
ACACTTCAGT AGGGGCTGTA CCCGGGCGGT CCCACTCTTC ACAGGAATCT GCACAGGTGG 120
CTTTCACCTC TGGACAGTGC ATTCCACACC CGCTCCACGG TAGAAGATGA TGTGTGTCTT 180
TGCTTGTGAA AAGCTTGTGA AAATCGTGTG TAGGCGTAGC GGCTACTTGA GTGCCAGCGG 240
ATTACCCCTA GTGGTAACAC TAGC 264

(2) INFORMATION FOR SEQ ID NO: 2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 261 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: cDNA to mRNA

(iii) HYPOTHETICAL: NO

(vi) ORIGINAL SOURCE:

- (A) ORGANISM: Picornaviridae
- (C) INDIVIDUAL ISOLATE: Ljungan 174F

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 2:

AGTCTAGTTT CATTCTGTGT GTGTTGGCA CTGAAATTAT TTCTGTCTCT GGGGTGCTTT 60
ACACTTCAGT AGGGGCTGTA CCCGGCGGGT CCCACTCTTC ACAGGAATTG CACAGGTGGC 120
TTTCACCTCT GGACAGTGCA TTCCACACCC GCTCCACAGT AGAAGATGAT GTGTGTCTTT 180
GCTTGTGAAA AGCTTGTGAA AATCGTGTGT AGGCGTAGCG GTACTTGAGT GCCAGCGGAC 240
ACCCCTAGTG GTAACACTAG C 261

2) INFORMATION FOR SEQ ID NO: 3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 264 base pairs
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: cDNA to mRNA

(iii) HYPOTHETICAL: NO

(vi) ORIGINAL SOURCE:

- (A) ORGANISM: Picornaviridae
- (C) INDIVIDUAL ISOLATE: Ljungan 145SL

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 3:

AGTTTGGTTC TCTCTTGAGT GTGTTTGTG TTAGCATAAT TTCTGTCTCT AGAGTGCTTT 60
ACACTCTAGT AGGGGCTGTA CCCGGCGGGT CCCACTCTTC ACAGGAATCT GCACAGGTG 120
CTTTCACCTC TGGACAGTGC ATTCCATACC CGCTCCACAA TAGAAGATGA TGTATATCTT 180
TGTTTGTGAA ATGCTCATGA AACGTGTGTG TAGGCGTAGC GGCTACTTGA ATGCCAGCGG 240
AACCCCCCTA GTGGTAACAC TAGC 264

(2) INFORMATION FOR SEQ ID NO: 4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 179 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS:
- (D) TOPOLOGY: unknown

(ii) MOLECULE TYPE: peptide

(iii) HYPOTHETICAL: NO

(v) FRAGMENT TYPE: internal

(vi) ORIGINAL SOURCE:

- (A) ORGANISM: Picornaviridae
- (C) INDIVIDUAL ISOLATE: Ljungan 145SL

(xi) SEQUENCE DESCRIPTION: SEQ ID NO: 4:

Lys Asp Leu Met Glu Ile Ala Arg Met Pro Ser Val Tyr Lys Gly Glu
1 5 10 15

Arg Thr Glu Pro Gly Gly Thr Asn Gly Tyr Phe Gln Trp Ser His Thr
20 25 30

His Ser Pro Ile Asn Trp Val Phe Asp Gly Gly Ile His Leu Glu Asp
35 40 45

Met Pro Asn Leu Asn Leu Phe Ser Ser Cys Tyr Asn Tyr Trp Arg Gly
50 55 60

Ser Thr Val Leu Lys Leu Thr Val Tyr Ala Ser Thr Phe Asn Lys Gly
65 70 75 80

Arg Leu Arg Met Ala Phe Phe Pro Ile Met Met Gln Gly Thr Gln Arg
85 90 95

Lys Lys His Lys Cys Leu Phe Met Val Cys Asp Ile Gly Leu Asn Asn
100 105 110

Thr Phe Glu Met Thr Ile Pro Tyr Thr Trp Gly Asn Trp Met Arg Pro
115 120 125

Thr Arg Gly Ser Val Ile Gly Trp Leu Arg Ile Asp Val Leu Asn Arg
130 135 140

Leu Thr Tyr Asn Ser Ser Pro Asn Ala Val Asn Cys Ile Leu Gln
145 150 155 160

Val Lys Met Gly Asn Asp Ala Lys Phe Met Val Pro Thr Thr Ser Asn
165 170 175

Ile Val Trp

SEQUENCE LISTING

<110> NIKLASSON, BO

<120> NEW PICORNAVIRUSES, VACCINES AND DIAGNOSTIC KITS

<130> 03786.002

<140> 09/147,801

<141> 1999-03-11

<150> PCT/SE97/01515

<151> 1997-09-09

<160> 20

<170> PatentIn Ver. 2.1

<210> 1

<211> 264

<212> DNA

<213> Ljungan virus

<400> 1

agtctagttat tatcttgat gtgtcctgca ctgaacttgtt ttctgtctct ggagtgcct 60
acacttcagt aggggctgta cccggggcggt cccactcttc acaggaatct gcacagggtgg 120
ctttcaccc tggacagtgc attccacacc cgctccacgg tagaagatga tgtgtgtctt 180
tgcttgtgaa aagcttgtga aaatcgtgtg taggcgttagc ggctacttga gtgccagcgg 240
attacccta gtggtaaacac tagc 264

D6
Contd.
<210> 2

<211> 264

<212> DNA

<213> Ljungan virus

<220>

<221> modified_base

<222> (1)..(264)

<223> "n" represents a, t, c, g, other or unknown

<400> 2

agtctagttt cattctgtgt gtgtttggca ctgaaattat ttctgtctct ggggtgcctt 60
acacttcagt aggggctgta cccggggcggt cccactcttc acaggaatnt gcacagggtgg 120
ctttcaccc tggacagtgc attccacacc cgctccacag tagaagatga tgtgtgtctt 180
tgcttgtgaa aagcttgtga aaatcgtgtg taggcgttagc ggntacttga gtgccagcgg 240
acnacccta gtggtaaacac tagc 264

<210> 3

<211> 264

<212> DNA

<213> Ljungan virus

<400> 3

agtttggttc tctcttgagt gtgtttgtg ttagcataat ttctgtctct agagtgcctt 60
acacttcagt aggggctgta cccggggcggt cccactcttc acaggaatct gcacagggtgg 120
ctttcaccc tggacagtgc attccatacc cgctccacaa tagaagatga tgttatatctt 180

tgtttgtgaa atgctcatga aacgtgtgt taggcgttagc ggctacttga atgccagcg 240
 aaccccccata gtggtaaacac tagc 264

<210> 4
<211> 179
<212> PRT
<213> Ljungan virus

<400> 4
 Lys Asp Leu Met Glu Ile Ala Arg Met Pro Ser Val Tyr Lys Gly Glu
 1 5 10 15

Arg Thr Glu Pro Gly Gly Thr Asn Gly Tyr Phe Gln Trp Ser His Thr
 20 25 30

His Ser Pro Ile Asn Trp Val Phe Asp Gly Gly Ile His Leu Glu Asp
 35 40 45

Met Pro Asn Leu Asn Leu Phe Ser Ser Cys Tyr Asn Tyr Trp Arg Gly
 50 55 60

Ser Thr Val Leu Lys Leu Thr Val Tyr Ala Ser Thr Phe Asn Lys Gly
 65 70 75 80

Arg Leu Arg Met Ala Phe Phe Pro Ile Met Met Gln Gly Thr Gln Arg
 85 90 95

Lys Lys His Lys Cys Leu Phe Met Val Cys Asp Ile Gly Leu Asn Asn
 100 105 110

Thr Phe Glu Met Thr Ile Pro Tyr Thr Trp Gly Asn Trp Met Arg Pro
 115 120 125

Thr Arg Gly Ser Val Ile Gly Trp Leu Arg Ile Asp Val Leu Asn Arg
 130 135 140

Leu Thr Tyr Asn Ser Ser Pro Asn Ala Val Asn Cys Ile Leu Gln
 145 150 155 160

Val Lys Met Gly Asn Asp Ala Lys Phe Met Val Pro Thr Thr Ser Asn
 165 170 175

Ile Val Trp

D6
<210> 5
<211> 241
<212> DNA
<213> Cardiovirus

<400> 5
 tgacagggtt atttcacct cttctttct actccacagt gttctatact gtggagggt 60
 atgtgttgcc ctttccttct tggagaacgt gcgcggcggt cttccgtct ctcgacaagc 120
 gcgcgtgcaa catacagagt aacgcgaaga aagcagttct cggctctagct ctatgtcccc 180
 caagaaaaca gctgttagcga ccacacaaag gcagcggAAC cccctccctg gtaacaggag 240
 c 241

<210> 6
<211> 243
<212> DNA
<213> Cardiovirus

<400> 6
tgacagggtt atttcacct cttctcttt ctacttcata gtgttctata ctatgaaagg 60
gtatgtgtcg ccccttcctt cttggagaac gtgcgtggcg gtcttccgt ctctcgaaaa 120
acgtgcgtgc gacatgcaga gtaacgcaaa gaaagcagtt cttggcttag ctctgggcc 180
cacaagaaaa cagctgttagc gaccacacaa aggcagcgga aacccctcc tggtaacagg 240
agc 243

<210> 7
<211> 247
<212> DNA
<213> Cardiovirus

<400> 7
aggccggtgt gcgttgtct atatgttatt ttccaccata ttgccgtctt ttggcaatgt 60
gaggccccgg aaacctggcc ctgtttctt gacgagcatt cctagggtc tttcccctct 120
cgccaaagga atgcaaggtc tggtgaatgt cgtgaaggaa gcagtccctc tggaaagctc 180
ttgaagacaa acaacgtctg tagcgcacctt ttgcaggcag cgaaaccccc cacctggcga 240
caggtgc 247

D6
<210> 8
<211> 188
<212> PRT
<213> Cardiovirus

<400> 8
Ser Asp Leu Leu Glu Leu Cys Lys Leu Pro Thr Phe Leu Gly Asn Pro
1 5 10 15

Asn Thr Asn Asn Lys Arg Tyr Pro Tyr Phe Ser Ala Thr Asn Ser Val
20 25 30

Pro Ala Thr Ser Met Val Asp Tyr Gln Val Ala Leu Ser Cys Ser Cys
35 40 45

Met Ala Asn Ser Met Leu Ala Ala Val Ala Arg Asn Phe Asn Gln Tyr
50 55 60

Arg Gly Ser Leu Asn Phe Leu Phe Val Phe Thr Gly Ala Ala Met Val
65 70 75 80

Lys Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro
85 90 95

Thr Thr Arg Asp Gln Ala Met Gln Ser Thr Tyr Ala Ile Trp Asp Leu
100 105 110

Gly Leu Asn Ser Ser Phe Asn Phe Thr Ala Pro Phe Ile Ser Pro Thr
115 120 125

His Tyr Arg Gln Thr Ser Tyr Thr Ser Pro Thr Ile Thr Ser Val Asp
 130 135 140

Gly Trp Val Thr Val Trp Lys Leu Thr Pro Leu Thr Tyr Pro Ser Gly
 145 150 155 160

Thr Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp
 165 170 175

Phe Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp.
 180 185

<210> 9

<211> 188

<212> PRT

<213> Cardiovirus

<400> 9

Ser Asp Leu Leu Glu Leu Cys Lys Leu Pro Thr Phe Leu Gly Asn Pro
 1 5 10 15

Ser Thr Asp Asn Lys Arg Tyr Pro Tyr Phe Ser Ala Thr Asn Ser Val
 20 25 30

Pro Ala Thr Ser Leu Val Asp Tyr Gln Val Ala Leu Ser Cys Ser Cys
 35 40 45

Met Ala Asn Ser Met Leu Ala Ala Val Ala Arg Asn Phe Asn Gln Tyr
 50 55 60

Arg Gly Ser Leu Asn Phe Leu Phe Val Phe Thr Gly Ala Ala Met Val
 65 70 75 80

Lys Gly Lys Phe Arg Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro
 85 90 95

Thr Thr Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu
 100 105 110

Gly Leu Asn Ser Ser Phe Asn Phe Thr Ala Pro Phe Ile Ser Pro Thr
 115 120 125

His Tyr Arg Gln Thr Ser Tyr Thr Ser Pro Thr Ile Thr Ser Val Asp
 130 135 140

Gly Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Ser Gly
 145 150 155 160

Thr Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp
 165 170 175

Phe Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
 180 185

<210> 10

<211> 188

<212> PRT

<213> Cardiovirus

<400> 10

Ser Asp Leu Leu Glu Leu Cys Lys Leu Pro Thr Phe Leu Gly Asn Pro
1 5 10 15

Ser Thr Asp Asn Lys Arg Tyr Pro Tyr Phe Ser Ala Thr Asn Ser Val
20 25 30

Pro Ala Thr Ser Leu Val Asp Tyr Gln Val Ala Leu Ser Cys Ser Cys
35 40 45

Met Ala Asn Ser Met Leu Ala Ala Val Ala Arg Asn Phe Asn/Gln Tyr
50 55 60

Arg Gly Ser Leu Asn Phe Leu Phe Val Phe Thr Gly Ala Ala Met Val
65 70 75 80

Lys Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro
 85 90 95

Thr Thr Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu
100 105 / 110

Gly Leu Asn Ser Ser Phe Asn Phe Thr Ala Pro Phe Ile Ser Pro Thr
115 120 125

His Tyr Arg Gln Thr Ser Tyr Thr Ser Pro Thr Ile Thr Ser Val Asp
130 135 140

Gly Trp Val Thr Val Trp Gln Leu Thr Pro / Leu Thr Tyr Pro Ser Gly
145 150 155 160

Thr Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp
165 170 175

Phe Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
180 185

<210> 11

<211> 188

<212> PRT

<213> Cardiovirus

<400> 11

Ser Asp Leu Leu Glu Leu Cys Lys Leu Pro Thr Phe Leu Gly Asn Pro
1 5 / 10 15

Asn Ser Asn Asn Lys Arg Tyr Pro Tyr Phe Ser Ala Thr Asn Ser Val
20 25 30

Pro Thr Thr Ser Leu Val Asp Tyr Gln Val Ala Leu Ser Cys Ser Cys
35 40 45

Met Ala Asn Ser Met Leu Ala Ala Val Ala Arg Asn Phe Asn Gln Tyr
50 55 60

Arg Gly Ser Leu Asn Phe Leu Phe Val Phe Thr Gly Ala Ala Met Val
 65 70 75 80

Lys Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro
 85 90 95

Thr Thr Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu
 100 105 110

Gly Leu Asn Ser Ser Phe Val Phe Thr Ala Pro Phe Ile Ser Pro Thr
 115 120 125

His Tyr Arg Gln Thr Ser Tyr Thr Ser Ala Thr Ile Ala Ser Val Asp
 130 135 140

Gly Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Ser Gly
 145 150 155 160

Ala Pro Val Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp
 165 170 175

Phe Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
 180 185


 <210> 12
 <211> 187
 <212> PRT
 <213> Cardiovirus

<220>
 <221> MOD_RES
 <222> (102)
 <223> variable or unknown amino acid

<400> 12
 Thr Asp Leu Leu Glu Leu Cys Lys Leu Pro Thr Phe Leu Gly Asn Leu
 1 5 10 15

Ser Asn Asp Thr Arg Val Pro Phe Phe Thr Ala Thr Asn Ser Val Pro
 20 25 30

Thr Glu Ser Leu Val Glu Tyr Gln Val Thr Leu Ser Cys Ser Cys Met
 35 40 45

Ser Asn Ser Met Leu Ala Ser Val Ala Arg Asn Phe Asn Gln Tyr Arg
 50 55 60

Gly Ser Leu Asn Phe Leu Phe Val Phe Thr Gly Ser Ala Met Thr Lys
 65 70 75 80

Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro Thr
 85 90 95

Thr Arg Asp Gln Ala Xaa Gln Ser Thr Tyr Ala Ile Trp Asp Leu Gly
 100 105 110

Leu Asn Ser Ser Phe Asn Phe Thr Val Pro Phe Ile Ser Pro Ser His
 115 120 125

Tyr Arg Gln Thr Ser Tyr Thr Ser Pro Ser Ile Ala Ala Val Asp Gly
 130 135 140

Trp Leu Thr Val Trp Gln Leu Thr Pro Leu Thr Phe Pro Ala Asn Val
 145 150 155 160

Pro Pro Ser Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asn Asp Phe
 165 170 175

Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
 180 185

<210> 13
 <211> 187
 <212> PRT
 <213> Cardiovirus

<400> 13
 Lys Asp Phe Leu Glu Ile Ala Gln Ile Pro Thr Phe Ile Gly Asn Lys
 1 5 10 15

Ile Pro Asn Ala Val Pro Tyr Ile Glu Ala Ser Asn Asn Ala Val Lys
 20 25 30

Thr Gln Pro Leu Ala Thr Tyr Gln Val Thr Leu Ser Cys Ser Cys Leu
 35 40 45

Ala Asn Thr Phe Leu Ala Ala Leu Ser Arg Asn Phe Ala Gln Tyr Arg
 50 55 60

Gly Ser Leu Val Tyr Thr Phe Val Phe Thr Gly Thr Ala Met Met Lys
 65 70 75 80

Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro Thr
 85 90 95

Ser Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu Gly
 100 105 110

Leu Asn Ser Ser Tyr Ser Phe Thr Val Pro Phe Ile Ser Pro Thr His
 115 120 125

Phe Arg Met Val Gly Thr Asp Gln Val Asn Ile Thr Asn Val Asp Gly
 130 135 140

Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Pro Gly Cys
 145 150 155 160

Pro Thr Ser Ala Lys Ile Leu Thr Met Val Ser Ala Gly Lys Asp Phe
 165 170 175

Ser Leu Lys Met Pro Ile Ser Pro Ala Pro Trp
 180 185

<210> 14
<211> 187
<212> PRT
<213> Cardiovirus

<400> 14
 Lys Asp Phe Leu Glu Ile Ala Gln Ile Pro Thr Phe Ile Gly Asn Lys
 1 5 10 15
 Ile Pro Asn Ala Val Pro Tyr Ile Glu Ala Ser Asn Asn Ala Val Lys
 20 25 30
 Thr Gln Pro Leu Ala Thr Tyr Gln Val Thr Leu Ser Cys Ser Cys Leu
 35 40 45
 Ala Asn Thr Phe Leu Ala Ala Leu Ser Arg Asn Phe Ala Gln Tyr Arg
 50 55 60
 Gly Ser Leu Val Tyr Thr Phe Val Phe Thr Gly Thr Ala Met Met Lys
 65 70 75 80
 Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro Thr
 85 90 95
 Ser Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu Gly
 100 105 110
 Leu Asn Ser Ser Tyr Ser Phe Thr Val Pro Phe Ile Ser Pro Thr His
 115 120 125
 Phe Arg Met Val Gly Thr Asp Gln Pro Thr Ile Thr Ser Val Asp Gly
 130 135 140
 Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Ser Gly Thr
 145 150 155 160
 Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp Phe
 165 170 175
 Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
 180 185

<210> 15
<211> 187
<212> PRT
<213> Cardiovirus

<400> 15
 Lys Asp Phe Leu Glu Ile Ala Gln Ile Pro Thr Phe Ile Gly Asn Lys
 1 5 10 15
 Ile Pro Asn Ala Val Pro Tyr Ile Glu Ala Ser Asn Thr Ala Val Lys
 20 25 30
 Thr Gln Pro Leu Ala Thr Tyr Gln Val Thr Leu Ser Cys Ser Cys Leu
 35 40 45

Ala Asn Thr Phe Leu Ala Ala Leu Ser Arg Asn Phe Ala Gln Tyr Arg
 50 55 60

Gly Ser Leu Val Tyr Thr Phe Val Phe Thr Gly Thr Ala Met Met Lys
 65 70 75 80

Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro Thr
 85 90 95

Ser Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu Gly
 100 105 110

Leu Asn Ser Ser Tyr Ser Phe Thr Val Pro Phe Ile Ser Pro Thr His
 115 120 125

Phe Arg Met Val Gly Thr Asp Gln Pro Thr Ile Thr Ser Val Asp Gly
 130 135 140

Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Ser Gly Thr
 145 150 155 160

Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp Phe
 165 170 175

Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
 180 185

Dle

<210> 16
 <211> 187
 <212> PRT
 <213> Cardiovirus

<400> 16
 Lys Asp Phe Leu Glu Ile Ala Gln Ile Pro Thr Phe Ile Gly Asn Lys
 1 5 10 15

Ile Pro Asn Ala Val Pro Tyr Ile Glu Ala Ser Asn Asn Ala Val Lys
 20 25 30

Thr Gln Pro Leu Ala Thr Tyr Gln Val Thr Leu Ser Cys Ser Cys Leu
 35 40 45

Ala Asn Thr Phe Leu Ala Ala Leu Ser Arg Asn Phe Ala Gln Tyr Arg
 50 55 60

Gly Ser Leu Val Tyr Thr Phe Val Phe Thr Gly Thr Ala Met Met Lys
 65 70 75 80

Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro Thr
 85 90 95

Ser Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu Gly
 100 105 110

Leu Asn Ser Ser Tyr Ser Phe Thr Val Pro Phe Ile Ser Pro Thr His
 115 120 125

Phe Arg Met Val Gly Thr Asp Gln Pro Thr Ile Thr Ser Val Asp Gly
 130 135 140

Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Ser Gly Thr
 145 150 155 160

Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp Phe
 165 170 175

Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
 180 185

<210> 17

<211> 187

<212> PRT

<213> Cardiovirus

<400> 17

Lys Asp Phe Leu Glu Ile Ala Gln Ile Pro Thr Phe Ile Gly Asn Lys
 1 5 10 15

Ile Pro Asn Ala Val Pro Tyr Ile Glu Ala Ser Asn Asn Ala Val Lys
 20 25 30

Thr Gln Pro Leu Ala Thr Tyr Gln Val Thr Leu Ser Cys Ser Cys Leu
 35 40 45

Ala Asn Thr Phe Leu Ala Ala Leu Ser Arg Asn Phe Ala Gln Tyr Arg
 50 55 60

Gly Ser Leu Val Tyr Thr Phe Val Phe Thr Gly Thr Ala Met Met Lys
 65 70 75 80

Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro Thr
 85 90 95

Ser Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu Gly
 100 105 110

Leu Asn Ser Ser Tyr Ser Phe Thr Val Pro Phe Ile Ser Pro Thr His
 115 120 125

Phe Arg Met Val Gly Thr Asp Gln Pro Thr Ile Thr Ser Val Asp Gly
 130 135 140

Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Ser Gly Thr
 145 150 155 160

Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp Phe
 165 170 175

Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
 180 185

<210> 18
<211> 187
<212> PRT
<213> Cardiovirus

<400> 18
Lys Asp Phe Leu Glu Ile Ala Gln Ile Pro Thr Phe Ile Gly Asn Lys
1 5 10 15
Ile Pro Asn Ala Val Pro Tyr Ile Glu Ala Ser Asn Asn Ala Val Lys
20 25 30
Thr Gln Pro Leu Ala Thr Tyr Gln Val Thr Leu Ser Cys Ser Cys Leu
35 40 45
Ala Asn Thr Phe Leu Ala Ala Leu Ser Arg Asn Phe Ala Gln Tyr Arg
50 55 60
Gly Ser Leu Val Tyr Thr Phe Val Phe Thr Gly Thr Ala Met Met Lys
65 70 75 80
Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro Thr
85 90 95
Ser Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu Gly
100 105 110
Leu Asn Ser Ser Tyr Ser Phe Thr Val Pro Phe Ile Ser Pro Thr His
115 120 125
Phe Arg Met Val Gly Thr Asp Gln Pro Thr Ile Thr Ser Ala Asp Gly
130 135 140
Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Ser Gly Thr
145 150 155 160
Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp Phe
165 170 175
Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
180 185

<210> 19
<211> 187
<212> PRT
<213> Cardiovirus

<400> 19
Lys Asp Phe Leu Glu Ile Ala Gln Ile Pro Thr Phe Ile Gly Asn Lys
1 5 10 15
Met Pro Asn Ala Val Pro Tyr Ile Glu Ala Ser Asn Asn Ala Val Lys
20 25 30
Thr Gln Pro Leu Ala Val Tyr Gln Val Thr Leu Ser Cys Ser Cys Leu
35 40 45

Ala Asn Thr Phe Leu Ala Ala Leu Ser Arg Asn Phe Ala Gln Tyr Arg
 50 55 60

Gly Ser Leu Val Tyr Thr Phe Val Phe Thr Gly Thr Ala Met Met Lys
 65 70 75 80

Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro Thr
 85 90 95

Ser Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu Gly
 100 105 110

Leu Asn Ser Ser Tyr Ser Phe Thr Val Pro Phe Ile Ser Pro Thr His
 115 120 125

Phe Arg Met Val Gly Thr Asp Gln Ala Thr Ile Thr Ser Val Asp Gly
 130 135 140

Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Ser Gly Thr
 145 150 155 160

Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp Phe
 165 170 175

Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
 180 185

D
 <210> 20
 <211> 187
 <212> PRT
 <213> Cardiovirus

<400> 20
 Lys Asp Phe Leu Glu Ile Ala Gln Ile Pro Thr Phe Ile Gly Asn Lys
 1 5 10 15

Val Pro Asn Ala Val Pro Tyr Ile Glu Ala Ser Asn Asn Ala Val Lys
 20 25 30

Thr Gln Pro Leu Ala Val Tyr Gln Val Thr Leu Ser Cys Ser Cys Leu
 35 40 45

Ala Asn Thr Phe Leu Ala Ala Leu Ser Arg Asn Phe Ala Gln Tyr Arg
 50 55 60

Gly Ser Leu Val Tyr Thr Phe Val Phe Thr Gly Thr Ala Met Met Lys
 65 70 75 80

Gly Lys Phe Leu Ile Ala Tyr Thr Pro Pro Gly Ala Gly Lys Pro Thr
 85 90 95

Ser Arg Asp Gln Ala Met Gln Ala Thr Tyr Ala Ile Trp Asp Leu Gly
 100 105 110

Leu Asn Ser Ser Tyr Ser Phe Thr Val Pro Phe Ile Ser Pro Thr His
 115 120 125

Phe Arg Met Val Gly Thr Asp Leu Pro Thr Ile Thr Ser Ala Asp Gly
130 135 140

Trp Val Thr Val Trp Gln Leu Thr Pro Leu Thr Tyr Pro Ser Gly Thr
145 150 155 160

Pro Thr Asn Ser Asp Ile Leu Thr Leu Val Ser Ala Gly Asp Asp Phe
165 170 175

Thr Leu Arg Met Pro Ile Ser Pro Thr Lys Trp
180 185

D
Conrad,